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(54) **ULTRA-THIN, PLANAR, PLASMONIC METADEVICES**

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(57) **ABSTRACT**

An ultra-thin planar device is used for arbitrary waveform formation on a micrometer scale, regardless of the incident light's polarization. Patterned perforations are made in a 30 nm-thick metal film, creating discrete phase shifts and forming a desired wavefront of cross-polarized, scattered light. The signal-to-noise ratio of these devices is at least one order of magnitude higher than current metallic nano-antenna designs. The focal length of a lens built on such principle can also be adjusted by changing the wavelength of the incident light. All proposed embodiments can be embedded, for example, on a chip or at the end of an optical fiber.

21 Claims, 6 Drawing Sheets